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PATTERNS FOR LEARNING.
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THE GOALS, RESEARCH TASKS, AND FUNCTIONAL OPERATION OF A RESEARCH AND INSTRUCTION (R AND I) UNIT WERE DESCRIBED. R AND I UNITS WERE ORGANIZED TO PROVIDE THE MEANS TO CONDUCT CLASSROOM RESEARCH AND TO DEVELOP MORE EFFICIENT LEARNING PROCESSES THROUGH THE COOPERATION OF LOCAL SCHOOLS, STATE PERSONNEL, AND UNIVERSITY FACULTY MEMBERS. THE ACTIVITIES OF A UNIT, COMPOSED OF A LEARNING SPECIALIST, TEACHERS, AND NONCERTIFIED ASSISTANTS, ARE SIMILAR TO TEAM TEACHING, BUT THE UNIT HAS DIFFERENT RESPONSIBILITIES. ANY VARIABLE OR PROBLEM OF SCHOOL LEARNING WAS REGARDED AS APPROPRIATE FOR RESEARCH BY R AND I UNITS. THE AUTHOR DISCUSSED 10 PRINCIPLES OF LEARNING THAT SHOULD BE APPLIED AND TESTED BY R AND I UNITS. THE PRINCIPLES STATED WERE (1) MOTIVATE YOUR STUDENTS, (2) PROVIDE FOR INDIVIDUAL DIFFERENCES, (3) SELECT MEANINGFUL MATERIAL, (4) ORGANIZE THE SUBJECT MATTER EFFECTIVELY, (5) PROVIDE APPROPRIATE MODELS FOR STUDENTS, (6) GUIDE INITIAL TRIALS, (7) ARRANGE PRACTICE PERIODS EFFECTIVELY, (8) EVALUATE THE STUDENT'S PROGRESS, (9) PROVIDE FOR RECALL, AND (10) HELP THE STUDENTS APPLY KNOWLEDGE. SOCIAL FORCES, FAMILY INFLUENCES, AND ADMINISTRATIVE PRESSURES WERE INCLUDED AMONG OTHER FACTORS TO BE CONSIDERED BY R AND I UNITS. THE AUTHOR ALSO GAVE A BRIEF DESCRIPTION OF THE RESEARCH AND DEVELOPMENT ACTIVITIES OF THE R AND I UNITS ESTABLISHED BY THE RESEARCH AND DEVELOPMENT CENTER FOR LEARNING AND RE-EDUCATION AT THE UNIVERSITY OF WISCONSIN. THIS PAPER WAS PRESENTED TO THE JOINT CONFERENCE, COUNCIL OF SCHOOL SUPERINTENDENTS, AND NEW YORK STATE ASSOCIATION SCHOOL DISTRICT ADMINISTRATORS (ROCHESTER, SEPTEMBER 30, 1965). (AL)

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(Paper read to the Joint Conference,
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September 30, 1965.)

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PATTERNS FOR LEARNING[1]

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Knowledge about outer space is increasing at an almost incomprehensible rate in this decade. This is possible in part because personnel, facilities, and equipment in large amounts are committed to the exploration of space. In turn, many people have set space exploration as a primary goal in life. Many of our youngest, brightest people are entering the field; many of our more mature, flexible people have changed their goals and are now devoting their main energy to the thrust into outer space.

The increase in knowledge about human learning is not so rapid, not so dramatic, as is the knowledge of space. But in this decade many learning psychologists are shifting their attention from the study of rats to the study of human beings, from the study of college students to the study of students in the schools. Likewise many educators are showing more concern for improving learning.

Let us now do some mutual exploring of a pattern of learning, one in which the focus is on research and development of more efficient learning in the schools. The research and development is a mutual undertaking of local school personnel, personnel from the State Department of Public Education, and university people--scholars from the behavioral sciences, the subject disciplines, communication, and the fine arts. We shall see how

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[1]Paper read to the Joint Conference, Council of School Superintendents and New York State Association School District Administrators, Rochester, New York, September 30, 1965.

knowledge about learning is put to use in the schools more quickly and how personnel, facilities, and equipment in large amounts are being made available for improving learning in the schools. In this connection, it is fair to say that federal legislation of the past four years to support education, if continued, will result in more new useful knowledge about school learning in the next decade than has been accumulated in the past century. Let us see how principles of school learning are being tried out and developed.

Come with me into an elementary school of 1970. As you enter, first notice the children. In this school, every child is learning as much as he can as well as he can. He is remembering most of what he learns and is putting it to use in terms of his own self-realization and the welfare of others. He learns some subject matter well each day and a record of his learning progress is kept and discussed with him. Here, each child is well understood as an individual. Every day he enjoys many rewarding associations with teachers and classmates. Further, members of the instructional staff call on the home at least once per month and there is a true partnership between the home and the school in educating the child.

Observe, too, that some of the children are in large groups; others are in small groups of 5 or 10, but most are working independently. This school building is designed to achieve objectives that can be accomplished through individual work and through small and large group activities.

These children and the staff may not be as thrilled with their activities as was Astronaut White when he first stepped from his space ship into outer space, but they do have a sense of exploration and drama. The children do experience the thrill of acquiring new knowledge and skills, also better human relations. The instructional staff does have a sense of mission and

commitment equal to that of the scientists and engineers who devise our outer space vehicles and systems. These children and their instructional staff comprise one of many recently formed research and instruction units within the school building and the school system.

What are the main characteristics of a research and instruction unit in the school? First, consider its composition. This unit is comprised of a learning specialist, two certified teachers, a full time intern who plans to become a learning specialist, a part time secretary, and a non-certified person who likes to work with children. There are 100 children in this unit. In the entire elementary school of 700 children there are seven research and instruction units. Not all are organized exactly alike, but in each there is a learning specialist who is directly responsible and accountable for the learning efficiency of the 100 pupils and for directing the instructional, research, and development activities of the unit.

Obviously this unit is very different from the usual organization of a building principal with 20 to 30 teachers, each having responsibility for a classroom group of about 30 children. But how is this type of unit alike and different from team teaching units as defined by Shaplin and Olds?[2] It is like team teaching in that it has similar goals of improving the learning of children, utilizing certified and non-certified personnel effectively in the educational process, and using instructional media and materials more effectively.

It is different from team teaching in several regards. First, the

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[2]Shaplin, J. T., & Olds, H. F. Jr., (Eds.) Team teaching. New York: Harper & Row, 1964.

research and instruction unit has the additional function of identifying and researching significant educational problems within the school system with assistance from the local school, the State Department, and university. The whole gamut of variables associated with school learning is open for research--the students, the subject matter, the instructional material, instructional media, teacher-pupil interactions, teaching methods, motivation, discipline, and the like. Any educational problem identified in the school, including desegregation, is appropriate for researching in one or more of the research and instruction units. A second function of the units, not assumed by teaching teams, is the development of instructional materials and procedures appropriate for use in the particular school and school system. Further, when anything--materials, method, or media--is found to work out well in one unit, it is readily diffused to other units and other school situations. Thus, the unit is organized to improve the immediate learning of children and also to enable research and development to proceed in an orderly fashion so that new and improved means of learning are constantly developed and researched. The new organization makes it possible for the school system to become more autonomous with respect to research and development and also to utilize the personnel and ideas from outside the school system more effectively.

The research and instruction unit is also different from most team teaching units in that the roles and responsibilities of the instructional personnel are clearly defined. The learning specialist not only has the responsibility for the instruction of the children, he also directs the research and development activities of his unit and cooperates with other

specialists from other units, with the building principal, with central staff, with any one designated by the school system to cooperate in research and development. The roles and responsibilities of all other members of the unit are also clearly defined.

The research and instruction unit is also different from most team teaching units in that the learning specialist is employed on a 12-month basis and receives a stipend of $3,000 to $5,000 annually above the usual teacher pay schedule. The responsibilities and related pay of the learning specialist make it possible to attract the most able young people, and some experienced teachers and principals, into this position as a life career. Thus, the learning specialists from within a school or throughout a school system can meet together any day of the week and for as many days of the year as may be necessary to accomplish any goal connected with instruction, research, and development. So that he can do this, he spends no more than half of the school day in actually teaching children.

Unfortunately today neither time nor experience permits a detailed outlining of the functions and roles of all the various types of research and instruction units, preschool through high school. As we shall see later, a cooperative group in Wisconsin is working on these matters during the current year. So let us consider another question.

How did this type of research and instruction unit in the elementary school come about? How did the many other units like it come into existence? What happened in the last half of the 1960's to make this type of school possible on a wide-spread basis in the early 1970's?

No one person, no one group of people can be identified as directly responsible for these schools. In the post-World War II era, many persons

became interested in improving learning opportunities for children in school, including such relatively diverse groups as psychologists, school administrators, school teachers, professors of education, State Department personnel, scholars in the subject disciplines, United States Presidents, Congressmen, parents--all these and many others came to realize that 19th century patterns of learning were not meeting the demands of 20th century society.

Since it would be impossible to consider the roles and efforts of all these people, let's instead identify contributions from just one area--the psychology of learning.

Increasingly, more learning theorists are accepting the view that a learning theory based only on experimentation with laboratory animals is not a valid theory because it has not been tested with human beings, the only truly effective learners among living organisms.

In the first decades of this century, educators and psychologists were hopeful that a comprehensive learning theory would emerge and that this theory would contribute greatly to the improvement of student learning in the schools. Although several comprehensive theories were formulated, they were based almost exclusively on experimentation in the animal laboratories, and their application to school practice did not produce revolutionary improvements in school. Quite the opposite, in the rapid shifting from one theory to another, much confusion reigned throughout the schools.

With the realization that traditional learning theories must be tested with human beings to determine their adequacy as theory, many psychologists turned toward studying in depth a single learning outcome

such as concepts, or skills, or attitudes, or personality development. Others tried to extend to school situations the principles they had formulated in the laboratories. They tried to validate laboratory principles through experimentation with human beings in non-laboratory settings. Other psychologists with experience in military settings during World War I attempted to apply task analysis and development procedures to educational problems. In other words, they analyzed the task of educating children and then tried to develop materials and procedures to accomplish this task, using the best research techniques along the way to try out the materials and procedures.

When psychologists tried out their theories in the school setting, they found that efficiency of learning was associated with many variables. These variables included those already mentioned--the students, the teachers, the subject matter, the instructional material, the instructional media, the organization for instruction, personnel outside the classroom associated with the school, and persons outside the classroom and school including those in the family and neighborhood. All of these variables must be considered in a theory of learning that is applicable to the classroom.

Current attempts to outline workable principles of learning are represented by the efforts of such people as Arthur Staats[3] now at the University of Wisconsin, who is engaging in a series of experiments to determine how well pre-school children from culturally disadvantaged areas can acquire writing, reading, and number concepts. Social psychologists Bandura and

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[3] Staats, A. W., & Staats, Carolyn. Complex human behavior: A systematic extension of learning principles. New York: Holt, Rinehart, and Winston, 1963.

Walters[4] have outlined a theory of social learning and personality development which emphasized the importance of learning through imitating exemplary models. This, of course, has direct application to the schools. Ausubel[5] has developed a theory of meaningful reception learning which attempts to explain the kind of learning that occurs when studying a book or listening to a teacher. Suchman[6] has worked industriously and persistently in identifying a program of inquiry training whereby children acquire the skills of scientific discovery. At the Research and Development Center at Pittsburgh, Glaser[7] and his associates are applying task-analysis techniques to children's learning in the elementary schools. Their ultimate goal is to have a complete set of instructional materials, kindergarten through grade six, available in all subject fields. Each child will perform tasks appropriate to him each day. His daily progress will be determined and fed into a computer which will program the instruction for the next day.

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[4]Bandura, A., & Walters, R. H. Social learning and personality development. New York: Holt, Rinehart, and Winston, 1963.

[5]Ausubel, D. P. The psychology of meaningful verbal learning. New York: Gruen & Stratton, 1963.

[6]Suchman, J. R. "The child and the inquiry process." In Passow, A. H., (Ed.) Intellectual development: Another look. Washington: Association for Supervision and Curriculum Development, 1964.

[7]Glaser, R. "Implications of training research for education." In Hilgard, E. R. (Ed.) Theories of learning and instruction. Sixty-third yearbook. Part I. Chicago: National Society for the Study of Education.

My conception of principles applicable to the classroom are incorporated in a series of models for instruction.[8] Time does not permit a discussion of all the models. However, let's consider ten principles of learning which, ideally, should be considered by every educator, whether he be administrator or teacher. All principles may apply to any subject field and to all school levels. The first 4 are relatively independent of a specific teaching process, yet they must always be kept in mind if we hope to produce any kind of efficient learning. These are principles that are ready to be applied and tested in many research and instruction units as described previously.

Principle One states: Motivate your students. Proper motivation, so essential for consistent student effort, is a major problem for most teachers. Recognition of the problem is only the first step toward solution. The next is direct action. The teacher may engage in four categories of behavior to get students activated. He could arouse curiosity and interest through the use of carefully selected materials and activities. Or he could enlist the cooperation of his students in setting class goals. Also, the teacher may manipulate rewards and punishments, competition and cooperation. And finally, he may provide his students with knowledge of their progress. The teacher should keep in mind, however, that motivation which is too intense may actually impede learning because of accompanying disruptive emotional states. In the

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[8] Klausmeier, H. J., & Goodwin, W. Learning and human abilities, Educational psychology. New York: Harper & Row, 2nd ed., 1966 (in press).

research and instruction unit, the learning specialist and his staff will experiment with these and other motivational procedures.

In selecting materials and activities with rich motivational value, the instructional staff should be guided also by Principle Two: Provide for individual differences. Any materials chosen, of course, should be well suited to the individual. This permits each student to reach his particular goal and to learn efficiently in the process. Two practices which facilitate this principle will be incorporated in the research and instruction unit. One is grouping pupils to the best advantage for a particular learning task. The other is improving materials, equipment, and physical arrangements for independent study. We must capitalize better on the available modern means of individualizing instruction.

When we have made ourselves aware of the techniques of gaining flexibility for individual adaptation, we can concern ourselves with Principle Three: Select meaningful material. If we want students to acquire, remember, and use information more efficiently, the material we teach must have high meaningfulness. Certain material is potentially more meaningful than others. For example, the word <u>bird</u> means more to English-speaking people than does the syllable <u>dax</u>. There are two ways of making semantic material more meaningful. A teacher could relate new material to what the student already knows, or he could provide experience with the referents, including objects and processes, for which the words stand. Knowledge of the value of meaningful content will be put to use more systematically in the research and instruction unit and continuous effort will be given to developing more meaningful material.

Curriculum planning will be carried out in the research and instructional unit with Principle Four in mind: Organize the subject matter effectively. Proper sequencing of subject matter enables students to comprehend information initially, to think productively about it, to remember it, and to use it in new situations. A student has difficulty appraising means-goals relationships and initial trials if he lacks knowledge about the sequence and organization of what he is learning. Unfortunately, the sequencing of subject matter has not been studied in depth until very recently. Nevertheless, we have the know-how to do a much better job of sequencing instruction than we are doing at present. Further, new knowledge is accruing rapidly in connection with this principle. The research and instructional unit can test and diffuse new ideas quickly regarding sequencing.

After much preliminary planning the research and instructional unit stands ready to apply and test the remaining six principles in its instructional program.

We know that students can learn effectively from a model or an example of the desired outcome. Our fifth principle concerns the need for an appropriate model for the student. This model may be an actual person, a verbal description of procedures, or an actual audio-visual representation. All of these help the student learn new responses, responses he has not made before. For example, the child who has never written the word man or any of its letters, profits not only from seeing the word but also from watching someone write it. By observing and imitating a model, the student eliminates many errors. Appropriate exemplary models for all children can be provided in the research and instructional unit. For example, there will be both males and females in

most research and instruction units. Further, not only degree holders certified to teach will be present, but also some non-degree persons who already serve as excellent models for their own children.

Principle Six also requires more research and development: Guide initial trials of pupils. Close surveillance of those first crude efforts is essential to the establishment of correct responses. Guidance may be given by words, physical contact, or demonstration. Early guidance has many beneficial results. It directs the learner's attention to more adequate skills or knowledge, aids the learner in understanding the nature of a successful performance, provides encouragement to continue, and relieves any anxiety that may appear if the student lacks self-confidence. We have more personnel available in the research and instruction unit to provide this guidance, also we can develop novel methods whereby guidance is more effective.

Once a learning task is understood by the pupil, the next job is to arrange practice periods effectively. This principle does not imply mere repetition of the same activity over and over again. Effective practice requires productive thinking, not lengthy drill sessions. To make learning more efficient, the research and instruction unit offers excellent opportunity to manipulate whole-part relationships of the content; the spacing of short but adequate practice sessions; the reinforcement of correct responses; and the correction of inadequate or incorrect responses.

Providing knowledge of progress should help primarily the student, not, as some educators believe, the teacher. The greatest possibility for the improvement of human abilities occurs in connection with this eighth principle: evaluate the student's progress. Informing students

of their progress and helping them overcome errors facilitates learning because it provides encouragement to continue and eliminates inadequate or incorrect responses. Lack of progress and consequent failure in reaching goals are principle contributors to a student's loss of interest and desire for learning. We know enough about the worth and use of evaluation to materially reduce the great loss of talent occurring through school failures.

Principle Nine states: Provide for recall. Securing long-term retention can be accomplished through systematic review of verbal material and spaced practice of skills. One means of providing review and practice is to elicit from the students themselves the information and skills needed for a new task. Practice may be arranged on a daily basis so that there is the actual management of practice on school tasks. This procedure produces more permanent learning than does holding one review or practice session immediately before a monthly examination. Nearly all generalizations about retention are drawn from laboratory studies. There is a tremendous research and development job to be performed in connection with improving retention. We can gain much practical knowledge about retention in children since the schools have them for 12 to 14 years.

Principle Four, dealing with the meaningfulness of material, is especially relevant to our final principle: Help the students apply knowledge. To insure that students will apply and use in the future what we teach them now, we must make new material meaningful and applicable. A verbal description of applications is less effective than participation in an actual situation in which new knowledge and skills can be put to use. The great loss in learning from one year to the next and the inability

to cross from one subject to another or from the school situation to outside the school results from lack of practice in applying knowledge. The research and instruction unit should make application of new learning to a variety of situations more feasible since the learning specialist has time for planning educational excursions, the utilization of community resources, and the like. Again, more personnel are available to execute these activities.

Do these ten principles adequately cover the major influences on learning efficiency? Although what I will mention next are not principles in the sense in which we have been using the term, they are nevertheless so important to classroom learning situations that they cannot be realistically omitted. I am referring to the realities which confront the research and instruction unit, the outside forces that make teaching-learning processes so complex. These forces are a part of our culture and of human nature. Yet they do have a definite correlation with efficiency of learning. We know that the outside forces impinging on the child affect his learning in school. For example, the lower the socio-economic level and social class of his family, the lesser utilization does the child make of school. Many factors contribute to the lack of efficient learning of children from lower social classes, many of which could be compensated for or removed with more schooling of the right kind. For example, we know enough about controlling children's behavior so that if we applied our knowledge properly, only a small portion of the school day would be necessary for custodial and disciplinary functions. We also know that we can provide a type of pre-school education that will help children overcome neighborhood deficits in language and vocabulary development.

Nowhere are research and instruction units needed more urgently than in the development of new and more effective approaches to the education of the culturally disadvantaged.

Besides the social and family forces, there are outside forces, reflected by the teacher, which are also related to learning. School administration is one of these reflected forces. Administrative support of the educational program facilitates learning by providing the materials and human resources, the instructional facilities and equipment so essential to modern education. The instructional staff needs assistance with a variety of instructional problems, including students who do not learn efficiently; yet many get no help with routine paper work, let alone with the special learning problems. The research and instruction unit provides a means whereby administrative support and leadership of teaching-learning processes can be made more directly effective for pupils through the learning specialist.

We also know that the characteristics of the entire group influence individual behavior and learning. For example, students in cohesive groups learn more effectively than do fragmented collections of individuals. Characterized by dissension, the fragmented group results in unwholesome rivalries, unfavorable attitudes, and low learning efficiency. This is one of the reasons for the need for a quick settlement of the problems attendant with school desegregation and with minority groups throughout the country. In the long run, only systematic research and development will secure lasting answers. The schools must find rational means for securing solutions to these complex educational problems accompanying urbanization of society and automation of production and distribution.

Emotional appeals, accompanied with increasing violence, are the alternatives facing most large school systems.

In the elementary school we visited earlier these and many other principles of learning are being tried. The principles are not new; they have been stated in many college courses. However, their consideration and application in a total instructional system is novel. In addition, new principles are being developed, based on systematic experimentation in schools throughout the country.

But haven't we been dreaming? Will there really be research and instruction units operating in 1970 in which every child has maximum opportunity to learn well initially, to remember what he learns, and to apply what he learns in his daily life? Will there be units and whole schools in which instruction is carried on in research and instruction units where roles and responsibilities for persons of varying abilities and interests are clearly defined? Will there be research and instruction units and schools in which innovations in subject matter, methods of instruction, motivational procedures, and other variables can be tested systematically? Will the schools have established these units so that they can research their own significant education problems, find solutions, and then quickly diffuse the solutions throughout the system with assistance from state departments and the colleges? The answer is a very probable "yes." Why is the "yes" probable?

Without going into many details let me suggest that for years the School of Education at the University of Wisconsin, under the dynamic leadership of Dean Lindley Stiles, has been pioneering in school improvement. Also, the University of Wisconsin has had a Wisconsin Improvement

Program, financed partly by the Ford Foundation, directed by Professor John Guy Fowlkes, working vigorously toward improved education in the schools. The State Department of Public Instruction in Wisconsin is strong and, under the able leadership of Superintendent Angus Rothwell, is greatly expanding its influence and modernizing its procedures and organization. An aura of experimentation and progress permeates many local school systems including Milwaukee, Racine, Madison, Janesville, and West Bend, to name only a few.

In September, 1964, at the University of Wisconsin, a Research and Development Center for Learning and Re-Education was established. One of the first four centers in the nation, it is supported with an initial grant of $500,000 annually for a five-year period by the United States Office of Education. Affiliated with the R and D Center at the outset were the University of Wisconsin and its many departments, the State Department of Public Instruction, and fifteen local school systems. With this kind of support from the Federal government, the state government, and the local governments an effective organization for planned change through research and development was established in the first year. Personnel from the R and D Center, the local schools, and the State Department, cooperatively planned various activities. Included in this planning is the development of research and instruction units in the schools of the type described earlier. A number of these units will start in the second semester, 1965-1966; others will be initiated in the first semester, 1966-1967. Their exact composition in relation to the number of students and instructional staff will vary and will be tested informally. Also, the relative emphasis given to research, development, and instruction will

vary. The units may differ markedly according to the level of schooling. We offer no estimate of the total amount of instruction in a school system to be offered in this type of unit.

During the current year, 1965-1966, we have outlined a two-step sequence of planning and initiating the research and instructional units. We shall first define the various types of research and instruction units that may be appropriate to the particular school system and simultaneously identify significant research and development activities to pursue in the units. We have already identified a significant number of learning variables associated with concept learning in mathematics, science, and English. These we will be ready to test in units once their instructional function is under control. During the current year also, once the experimental units that fit the needs of the local school systems have been described, personnel will be selected and institutes will be organized for the second semester and the summer of 1966. The staff of the research and instructional units and other personnel such as building principals, supervisors, superintendents, learning specialists, and professors from the subject matter disciplines will participate in the units.

We feel that planning and action involving persons with varying specialties is requisite to establish patterns for efficient pupil learning. Theories of learning are going to be developed and tested in school settings. We are trying to work out the necessary arrangements among the local schools, the R and D Center, the federal government, and private agencies, so that we can move rapidly toward improving efficiency of school learning, toward providing the facilities and environments in which each child has excellent opportunities to learn efficiently.

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